US Army Corps of Engineers

Energy Conservation and Sustainability under MILCON Transformation

Army Energy Workshop
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Army MILCON Transformation

USACE Challenge: Save 15% in cost and 30% in time while delivering quality

Why Reinvent the MILCON Process?

• Current standards/processes do not support DoD's requirement of getting quality facilities in the timeframe needed

• Program-wide funding shortfall will occur in the status-quo scenario

"There is no choice"

MILCON Transformation

- Utilize *industry standards*, *codes and best practices* and keep only specialized requirements necessary to meet the Army's needs
- Issue *performance based contracts* vs current prescriptive contracts
- Centralize management of this new MILCON Program initiative
- Execution of Army MILCON as a continuous building program
- Standardization of facilities and processes
- Consider *non-traditional construction methods* such as prefabricated, pre-engineered, panelized, and modular construction
- Use *repeat business* as an incentive for good performance

MILCON Transformation

Comparison Facilities:

- Barracks Apartments
- Dining Facilities
- College Cafeterias



- Battalion/Brigade Headquarters
- Company Operations Facilities
- Vehicle Maintenance Shops

- Office Buildings
- Light Industrial Bldgs
- Heavy Equipment Repair Fac

Centers of Standardization – Major Roles

- Eight (8) Centers of Standardization
- Implement functional and operational relevant standard facilities
- Roles determined by decision point in life-cycle of MILCON process
 - Develop functional and operational Army Standard Designs
 - Verify Army Standards are met ICW OACSIM-ARSTAF FDT
- NEW Traditional Planning, Programming, D-C support
- Review and ensure compliance with Army Standards and Army Standard Design-Criteria for OACSIM
- Review and concurrence of potential need for waiver request prior to Garrison submission
- Technical Assessment of waiver requests
 - Assist OACSIM with impact identification and recommended solutions for accelerated implementation on MCA program
 - Refine follow-on functional and operational requirements with Army Functional Proponent

Centers of Standardization Realignment – 6 March 2006

• Huntsville Center (15)

- Physical Fitness
- Outdoor Sports Facility
- Child Development (2)
- Youth Activity Centers
- Consolidated Fire, Safety and Security Facility
- Fire Station
- Army Community Service Center
- Bowling Center RFP
- Hazard Material Storage
- Close Combat Tactical Trainer
- Mil. Ops. Urban Terrain Facility
- Training Ranges
- Battle Cmd Training Ctr.
- Training Support Ctr.
- Medical Facilities

• Louisville District/LRD (2)

- Army Reserve Centers
- Operational Readiness Training Complex

• Norfolk District/NAD (7)

- General Instructional Facility
- Classroom 21
- Enlisted personnel Dining Facility
- Mil. Entrance Processing Stations
- Family Housing RFP
- Information Systems Facility
- Criminal Investigation Facility

Omaha District/NWD (2)

- Religious Facilities
- Access Control Points

Centers of Standardization Realignment - 6 March 2006

- Mobile District/SAD (2)
 - Aviation Vertical Construction
 - 4 Star HQ Facility
- Savannah District/SAD (6)
 - Company Operations Facility
 - Tactical Equipment Maintenance
 - Brigade Operations Complex
 - Brigade/ Battalion HQ: Admin
 - Cmd./Control: UEy and Corps (UEx) HQ: Admin/Operations
 - Deployment Facility
- Honolulu District/POD (2)
 - Unaccompanied Officers Quarters
 - Transient Officers Quarters

• Ft. Worth District/SWD (5)

- Unaccompanied Enlisted Personnel Housing
- Basic Combat Training Complex/One Station Unit Trainee
- Advanced individual Training Complex
- General Purpose Warehouse
- Central Issue Warehouse

Product-Line Design/Build IDIQ Contracts

- Capitalizes on *industry strengths* and best practices
- Encourages *non-traditional builders* to compete
- Provides separable contract packages for *small business opportunities* and setaside programs
- Provides repeat business incentive for good performance
- Repetitive nature work *reduces learning curve*, providing for lower cost, faster delivery and improved quality
- Facilitates incorporation of *lessons learned* into future task orders
- Maximizes sustainability opportunities
- Allows supporting District to concentrate on one or two product lines and become the **expert within the region**

The 3-Phase Solution

FY 06/07	7	FY 08	FY 09 +
Geographic Disaward contract using the USAG design build McRFP template. • Uses industry standard codes processes • Contains bub diagrams of fact standards	s CE odel s and ble	Continue using Model RFP template and gather "best practices" Stand up the COS • Convert bubble diagrams into standard plans and issue as D/B task order • Implement regional SATOC contracts	Fully develop COS adapt-build • Complete 3-D BIM model designs • Issue design-bid-build task orders • Installation specific designs of the standard facility plan
• Follows implementation	guide	 Move toward adapt- build prototype 	11

What does this mean for Installations?

- Master planning and project phasing should consider the implications of this acquisition approach.
- Better control of project scoping and expected costs.
- Once standard design is developed, changes should be limited and may require approval of the Army Facility Standardization Committee.
- Design Build requires earlier submission of installation input.



ARMY IMPLEMANTATION GUIDE

- Being prepared by CERL/USACE that can be executable by USACE/Army.
- Will assist PDT in implementing LEED.
- Will identify 4 stages for SDD scores review.
- It will establish documentation requirements for USACE/Army.
- Will clearly state that Army requires self-certification but not necessarily full GBC registration.
- Will require minimum LEED Silver and will identify required, preferred and avoid credits. Also will identify credits, installations are responsible for.

USACE IMPLEMENTATION GENERAL

- Engineering and Construction Bulletin (ECB) 2006-02 Requires:
 - Establish goals at planning charrettes.
 - Refine and report LEED levels in P2 at 4 designated stages.
 - Self-certify final ratings jointly by the DPW or the Reserve Component equivalent, USACE district, designer, CoS and contractor.
 - USACE PM metrics used to track LEED compliance (P2).

ARMY IMPLEMENTATION FOR DB

- RFP to require minimum LEED Silver.
- RFP to have LEED checklist identifying required, preferred and avoid points.
- RFP to layout documentation requirements.
- Proposors to identify how they intend to meet the LEED requirements.
- Army implementation guidance will have DB contractual guidance.

ARMY IMPLEMENTATION FOR DBB

- At parametric estimate stage:
 - Identify preferred, required and avoid points in addition to those required by Army.
 - Refine cost estimates and identify additional costs, if any, to go to LEED Silver.
 - Assure these points become integral part of design.
- Documentation per implementation guidance.
- USGBC registration is not required.

TRAINING

- USACE is the first Federal agency to bulk purchase a block of web based training module for designers and architects from USGBC.
- USACE can assist ACSIM and IMCOM to provide LEED training for DPWs.
- USGBC training for 100 USACE personnel is nearing completion.
- Working with USGBC and its faculty for additional training for PMs, designers and construction managers.
- USACE has SDD POC at every MP district and CoS, who is in constant touch with HQ.

VALIDATION

- Subject Matter Experts (SMEs) at districts/CoS are responsible to make sure proper documentation is provided.
- HQUSACE developed metric for SDD reviews and LEED levels achieved.
- HQUSACE PM for SDD monitors and oversees compliance.
- Army SDD team will validate selected projects per Army implementation guide.
- Each CoS will have at least one LEED-AP who will monitor and verify LEED process.

OUTREACH PROGRAM

- Interagency Sustainability Working Group (DoE lead)
 - Federal Memorandum of Understanding (MOU)
 - MOU Implementation Plan
- Tri-Service Working Group, three levels
- USGBC Volume Build Program (OSD concept)
- USGBC Committees
- Web based training

NEXT STEPS

- Complete & adopt Army implementation guide.
- Work with USGBC on its portfolio program and try to influence it to benefit the Army.
- Continue further training for designers and construction managers.
- Adopt LEED-Homes for AFH and RCI
- Continue working with ACSIM and CERL on SDD issues.
- Assist tri-service cost committee to include SDD and EPACT in unit costs.



EPACT 05 Requirements

- Energy/electric metering in federal buildings by 2012
- Energy Star and FEMP products
- Buildings to be designed to 30% below ASHRAE 90.1 or International Energy Conservation Code if Life Cycle Cost-Effective. Establish baseline energy budgets using baseline equipment
- Requires premium efficient motors and equipment
- All requirements are in MT RFP.

Energy-Star Equipment Efficiency Requirements

- ENERGY STAR qualified boilers have an annual fuel utilization efficiency (AFUE) rating of 85% or greater.
- ENERGY STAR qualified oil and gas furnaces have annual fuel utilization efficiency (AFUE) ratings of 83% and 90%, or higher.
 - Note: The Designer of Record (DOR) is required by RFP & EPACT 05 to specify Energy Star equipment.
 Specifying Energy Star equipment will help to meet 30% better than 90.1.

EPACT 05 IMPLEMENTATION

D-B RFP addresses the following:

- Metering all utilities Per EPACT 05 Elect, Gas & Water
- FEMP Energy Star Equipment and premium efficient motors **Per EPACT 05** if LCC
- 30% less energy than ASHRAE 90.1 2004 **Per EPACT 05**
 - RFP will have table with energy budget target for tier 1 facilities only, in each climate zone
 - List of options that can be used by DOR that will fully achieve 30% for example:
 - » Envelope u-values
 - » Lighting solutions
 - » HVAC systems and schedules

EPACT 05 IMPLEMENTATION

• D-B RFP addresses the following (continued):

- HVAC Controls performance testing
- HVAC Testing Adjusting and Balancing
- HVAC Commissioning
- LEED Silver
- Indoor Air Quality
- Maintenance considerations all systems
- Limit Energy consumption all systems
- Interoperability of systems

EPACT 05 IMPLEMENTATION

Advertise RFP and Evaluation Proposals

- Receive and evaluate proposals
 - Evaluation criteria used by COS
 - Meet 30% less energy usage than ASHRAE 90.1
 - » Contractor describes strategy to achieve
 - Narrative also addresses the following
 - » High efficiency equipment and motors EPACT 05
 - » Heat recovery systems
 - » High efficiency lighting fixtures
 - » High efficiency plumbing equipment
 - » Experience in SDD and LEED
 - » Maintainability, Operability & Durability
 - » Reduced Energy consumption HVAC, lighting, power & plumbing
 - » Energy recovery systems
 - » Variable speed pumping and AHUs
 - » Past performance of key mechanical & electrical subs
 - » Contractor can propose Betterments

EPACT 05 VALIDATION

- Design validation after Award
 - Designer of Record (DOR) is responsible to convert RFP & accepted proposal to completed design
 - DOR uses BLAST/DOE-2 software to determine compliance with 30% better then ASHRAE 90.1 or selects RFP options
 - Contractor Submits ASHRAE 90.1 compliance documentation
 - COS will review design for compliance with 30%
 - Program will furnish LCC options to satisfy 30% requirement
 - Design can be fast track
 - Divide design into packages
 - Construction proceeds after Corps has reviewed the final design for each package
 - USACE Confirms EPAct 05 and LEED are met or exceeded
 - Training of COS staff to validate EPACT 05 and LEED
 - Develop CMR metric for EPACT 05 and LEED

EPACT 05 VALIDATION

Construction

- QA/QC Validation of EPACT 05
 - 3-Phase inspection documented with daily QA/QC reports
 - Preparatory inspection for each phase of work
 - Initial inspection for each phase of work
 - Follow-up inspection for each phase of work
 - Document EPACT 05 compliance
 - Testing to verify contractor meets EPACT 05 requirements
 - » Performance testing of equipment and controls systems
 - » Testing Adjusting & Balancing (TAB) of HVAC system
 - » HVAC Commissioning
 - Submittal review to determine compliance with RFP, Proposal & Design
- Red zone meeting between QA/QC to Document EPACT 05 compliance
 - Meeting held with contractor, Corps and user before completion to confirm
 - Testing complete or on schedule
 - Testing Adjusting & Balancing (TAB) of HVAC systems done
 - HVAC commissioning complete/on schedule
 - HVAC controls testing complete
 - Test reports complete

EPACT 05 VALIDATION

- Construction (Continued)
 - Train O&M staff document attendance
 - O&M manuals turned over
 - As-Built drawings complete and turned over
 - Prefinal inspection
 - Conducted at contract completion & attended by
 - Corps
 - Contractor
 - User
 - Punch list generated during Prefinal inspection is cleared or addressed before final inspection
 - Final inspection is attended by
 - Corps
 - Contractor
 - User
 - Warranty Phase starts at BOD

EPACT 05 CERL ANALYSIS RESULTS

D-B RFP

- RFP will be updated to include results of CERL analysis of target Energy Budgets for Tier I facilities, when results are available
 - Milestones
 - » Training & permanent party Barracks study complete January 07
 - » TEMF, Battalion Headquarters May 07
 - Will include energy budget targets for each facility in RFP
 - Energy design options for each facility and climate zone
 - Contractor will provide a submittal incorporating the option or provide energy analysis proving the actual design is 30% better than 90.1
 - Submittal will be reviewed by appropriate Corps personnel
 - Study will address net increase in first cost to achieve 30% better
 - POCS
 - ACSIM Don Juhasz and Jim Patton
 - HQUSACE Gary Bauer and Bob Billmyre
 - CERL Alexander Zhivov and Dale Herron

Permanent Barracks Energy Budgets by Climate Zone

Climate Zone	City	Baseline Energy Budget (kBtu/ft²)	Target Energy Budget (kBtu/ft²)
1A	Miami, FL	41.0	28.7
2A	Houston, TX	42.2	29.5
2B	Phoenix, AZ	41.4	29.0
3A	Memphis, TN	42.2	29.6
3B	El Paso, TX	38.4	26.9
3C	San Francisco, CA	37.3	26.1
4A	Baltimore, MD	46.5	32.6
4B	Albuquerque, NM	41.5	29.1
4C	Seattle, WA	42.5	29.8
5A	Chicago, IL	52.1	36.5
5B	Colorado Springs, CO	46.7	32.7
6A	Burlington, VT	57.0	39.9
7A	Duluth, MN	63.8	44.6
8A	Fairbanks, AK	81.7	57.2

The baseline buildings comply with the minimum requirements of ASHRAE Standard 90.1-2004. The Target Energy Budget is 70% of the Baseline Energy Budget.

Permanent 1+1 Barracks Proposed Energy Conservation Measures to achieve 30% Better

- The following are options that may be used by DOR
 - Improved envelope insulation (R-values TBD)
 - Improved envelope tightness to reduce infiltration (to near European stnd)
 - Cool Roofs in all climates but region 8
 - Central ventilation air units to provide required ventilation and dehumidification of the <u>whole</u> building.
 - Separate HVAC systems for sensible heating and cooling in individual rooms (e.g., four-pipe fan-coil units or radiant heating/cooling panels)
 - External shading devices
 - Thermal Mass

Permanent 1+1 Barracks Proposed Energy Conservation Measures to achieve 30% Better (Continued)

- Gray water heat recovery
- Water heaters high efficiency instantaneous
- Heat pumps where applicable
- Radiant panels and floors where applicable
- Exhaust energy recovery
- Set Back thermostats
- Exhaust damper control
- Duct sealing and insulation
- Energy Star equipment, boilers and chillers required by EPACT 05
 - Note: Each item will be provided by climate zone as a product of the energy performance analysis with the energy budget. The RFP will have this info in a table.

Permanent 1+1 Barracks Proposed Additional Post-construction testing to insure 30% Better

- The following tests will be added to MT RFP
 - Blower Door Testing of Entire Envelope to insure required building tightness achieved
 - Contractor will be responsible for correcting deficiencies if test fails
 - Thermography of envelope to insure required insulation levels achieved
 - Contractor will be responsible for correcting deficiencies if test fails

NOTE: All other testing already required by MT RFP (PVT, TAB, Cx of HVAC system, etc) is still needed to insure 30% better

Summary: MT RFP Does Implement EPACT 05

- DOR must design new facilities to achieve an energy consumption level at least 30% below ASHRAE 90.1 2004 if LCC effective
- RFP requires metering of all facilities
- RFP requires the DOR to specify Energy-Star or FEMP equipment
- RFP requires the DOR to specify premium efficient motors

FY 07 Activities to Implement EPACT 05 for All Facilities

- Updating Corps training (PROSPECT) courses
- Developing EPACT 05 checklist tool to be used by Corps staff during proposal review, design and construction
- Continuous coordination with ACSIM & CERL to ensure sequence of EPACT 05
- Coordination with final DOE EPACT 05 interim guidance
- Provide training to COS and construction staff on validating EPACT 05 and LEED implementation
- Complete CERL energy budgets and envelope options for tier 1 facilities TEMF, Barracks and Battalion Hqs
- Integrate all EPACT 05 guidance into standard Army processes and execution policies
- Possible team of HQUSACE, COS, ACSIM, CERL and local district to monitor process.

